Bureau of Reclamation
Year 2000 IT
Comprehensive Plan

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Bureau of Reclamation
Year 2000 IT Comprehensive Plan

Introduction

The U.S. Bureau of Reclamation (Reclamation) is systematically assessing the magnitude of the Year 2000 (Y2K) as it affects or may affect automated technologies used throughout our agency.

Of particular concern are those automated systems relating to the Information Technology (IT) or computer arenas. These arenas include computer software (s/w), both Commercial Off The Shelf (COTS) and locally developed applications designed to perform Reclamation specialized functions, computer hardware (h/w), including mini and micro (PC's) computers, communication devices, servers, etc. This document identifies known Reclamation Y2K compliancy issues and details methodology to ensure Reclamation Y2K compliancy.

Other devices, such as various automated controllers containing date computational capabilities are also being identified, accounted for, and designated for renovation where the device is not Y2K compliant.

A prime objective is to assure all automated systems will perform at a satisfactory level when the years 1999 and 2000 begin, with no degradation of performance or unexpected calculations based on date formats.

Funding Strategies

Reclamation will fund Y2K efforts, not already budgeted as part of planned upgrades, maintenance, or replacements, by diverting funds from lower priority, or non-critical projects during fiscal year 1997 through 1998. These funding decisions will be made at the local office level. Requests for required additional funding for FY-1999 and FY-2000 will be coordinated by W-6300.

Fiscal accountings of Y2K projects will be closely monitored assuring adequate funding for all critical and essential system's renovations or replacements. Best estimates for each renovation effort will be funded as soon as specific needed costs and resource requirements are identified.

Each region/office will be responsible for budgeting and funding their Y2K costs as reflected in the following table:

Y2K Noncompliant Renovation Estimates:

Region/Office	*June 6, Total Estimated Applications Renovation Costs*	*June 6, Total Estimated PC's & Portables Upgrades*	*June 6, Total Estimated Other Hardware Upgrades*	*Total Current Application & PC Costs*
Human Resources Office	$0.00	$10,800.00	$44,100.00	**$10,800.00**
Commissioners' Office	$0.00	$43,625.00		**$43,625.00**
Management Services Office	$330,250.00	$62,375.00		**[1]$436,725.00**
Technical Service Center	$42,680.00	$175,700.00		**$218,380.00**
Great Plains Region	$142,200.00	$202,800.00	$4,800.00	**$349,800.00**
Pacific Northwest Region	$768,720.00	$234,300.00	$3,900.00	**$1,006,920.00**
Mid Pacific Region	$111,817.00	$202,800.00	$59,600.00	**$374,217.00**
Upper Colorado Region	$183,018.00	$187,800.00	$28,500.00	**$399,318.00**
Lower Colorado Region	$50,000.00	$156,000.00	$0.00	**$206,000.00**
Totals	**$1,628,685.00**	**$1,276,200.00**	**$140,900.00**	**$3,045,785.00**

Other	*Estimated Total Costs*
Data Communication (Routers, Switches)	**$80,000.00**
FTE/Reclamation Coordinators	**$200,000.00**
Totals	**$280,000.00**

Issues & Concerns

Specialized systems, containing both s/w and h/w components, often considered as "turnkey" systems found within Reclamation were very costly to develop in the past. Some of these systems are not Y2K compliant and are critical in the operation of Reclamation's water resource projects. For many of these specialized systems, both the s/w and the h/w will require

[1] Includes balance of Reclamation-wide Hardware upgrades.

replacement before 1999. Early estimates for replacing the non-Y2K compliant specialized systems exceeded $5 million. (See current estimate above under "Special Purpose Equipment".)

Even though a concerted awareness effort has been instigated and completed throughout Reclamation, some systems may have been overlooked.

Nearly all control mechanisms, such as those found on elevators, air-conditioning units, fire protection systems, security systems, water and power monitoring systems, and other facility related systems are not directly under the control or Reclamation. These systems are furnished and/or controlled by other government agencies, such as the General Services Administration (GSA), or private firms whom Reclamation leases office space and other facilities from. The responsible property and facility services offices will continue an on-going contact with GSA to insure any non-Y2K compliant mechanisms are replaced.

Specialized controllers, such as those found at dam or canal sites are being tested to assure Y2K compliance, and/or safety compliance for the years 1999 and 2000.

Strategy Definitions:

Several terms have been used with different meanings depending on context, reporting requirements, analytical background and normal differences in interpretation. Through the experience of trying to ascertain accurate data for analysis, we found misunderstandings of terms contributed to the difficulty in obtaining accurate inventory information. The following lists several of the terms not only found in this document, but which are and will be used in current and future reporting documents to USBR management, the DOI Y2K coordination team, OMB, and others as required or requested.

Renovation (Reengineered): The process of converting an application or process bringing it into Y2K compliance. This includes rewriting of software, replacement of hardware components, and in some instances complete replacement of software and hardware systems. For analysis clarification, computer applications which need to be converted for Y2K compliance reasons only, are marked with the status of reengineering in the Y2K database. Some systems will be considered "renovated" when they are **replaced** because of Y2K compliance reasons only.

Redevelopment: To change, rewrite, or significantly modify an application (Hardware and/or software) for reasons other than Y2K compliance. These systems typically have been identified and budgeted for replacement for reasons such as modernization, and/or changes in requirements or functionality. Even though redeveloped applications have been planned for, or are already in some stage of development, Y2K-compliant requirements

must be part of the systems base requirements to assure compliance when the system is compliant.

Retirement: Application/system will be retired, or no longer in use after December 31, 1998.

Priority: For the purposes of categorizing renovation/redevelopment projects based on urgency and need, and more clearly identify those systems of importance to USBR, the following five terms categorize each Reclamation system:

Mission Critical: Applications critical to the mission of the U.S. Bureau of Reclamation. Such systems may include systems critical to the operation of water flows, precipitation monitoring, electric power controllers, accounting, payroll, etc. Other Mission Critical systems would include systems where failure may risk life and property, or render critical Reclamation operations inoperable.

Mission Essential: Applications essential to the business and operation of Reclamation. Without a system denoted as mission essential, the business/operation process could manually function, but only for a very short period of time, usually less than two weeks.

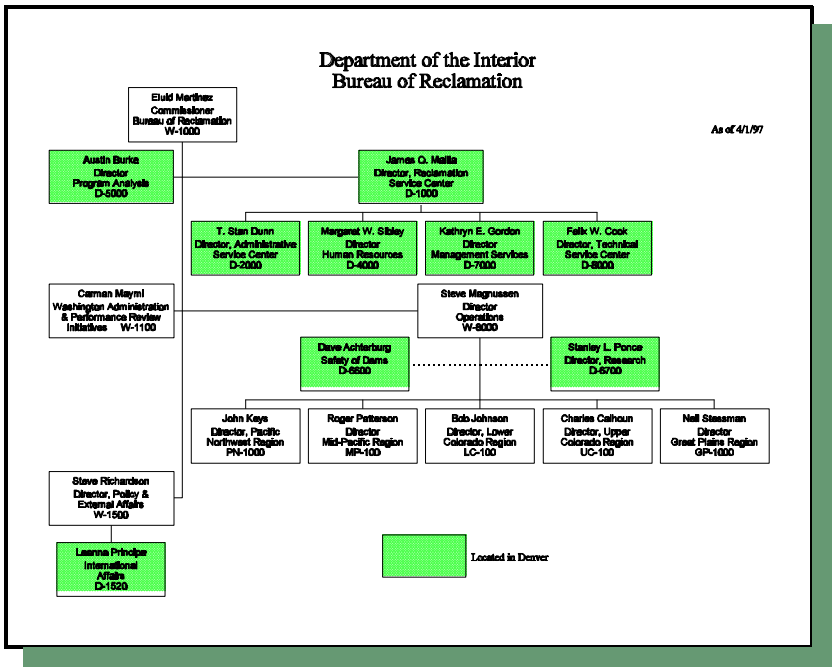
Mission Impaired: Applications important to the operation of business within Reclamation. The business process could be completed without the application, but would be highly costly, very difficult, or would result in a loss of an important business function.

Non-Mission Essential Application is needed for an office process, administrative function, or routine operation, which when automated, saves time, and human resources. The loss of such a system would cause inconvenience, additional costs in labor and time, and would hamper an office's ability to perform their function.

Unassessable: Systems not already identified, but are considered desirable for the running of a business process for the purposes of efficiency or effectiveness.

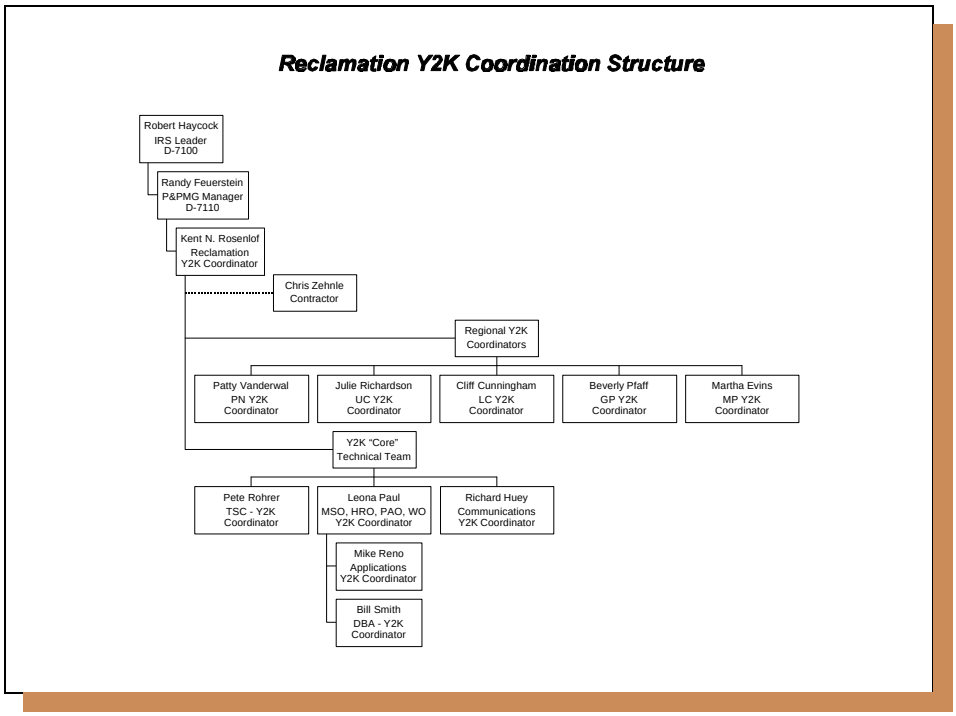
Organizational Responsibilities

The following Figures illustrates the high-level Reclamation organization and the Y2K coordination structures. **Reclamation Management**:



USBR Organization Diagram

Y2K Coordination Teams:



Y2K Coordinators

The Y2K coordination teams were designed to provide effective levels or reporting and coordination for each major office within Reclamation. There is a representative from each region and each major Washington/Denver organization. Also, areas of special concern, such as electronic communications, database properties, and application concerns have been assigned to individuals for not only coordination issues but also to field technical questions as they arise. All issues are funneled through the Reclamation coordinator who in turn provides reports for Reclamation management, DOI Y2K coordination efforts, and mandated reporting to OMB and GAO.

Office/Organizational Responsibilities and Buy-In

Quarterly Reports: D-7110 (Rosenlof) will report on a quarterly basis, status on all Y2K efforts within Reclamation. Reports will be generated to meet the quarterly reporting requirements from DOI to OMB. A quarterly report will also be made available for Reclamation

senior management, and to all involved Y2K coordinators. The Y2K issue, status and emphasis of importance are dynamic issues, requiring constant monitoring of accomplishments, set back and new developments.

Certification: Each responsible office will be required to certify compliance for each system they're responsible for, which will be in operation after December 31, 1998. Written documentation will be necessary for certification.

Relinquished Systems: Automated systems which are turned over to water users, local governments and water districts should be Y2K compliant. If such applications are not Y2K compliant, notification to the new owners must be made, and accommodation to assist in renovation of Non-Y2K compliant systems will be made by the relinquishing office.

All Employee Notifications: On a periodic basis, status reports, points of importance and other notifications will be made to all USBR employees.

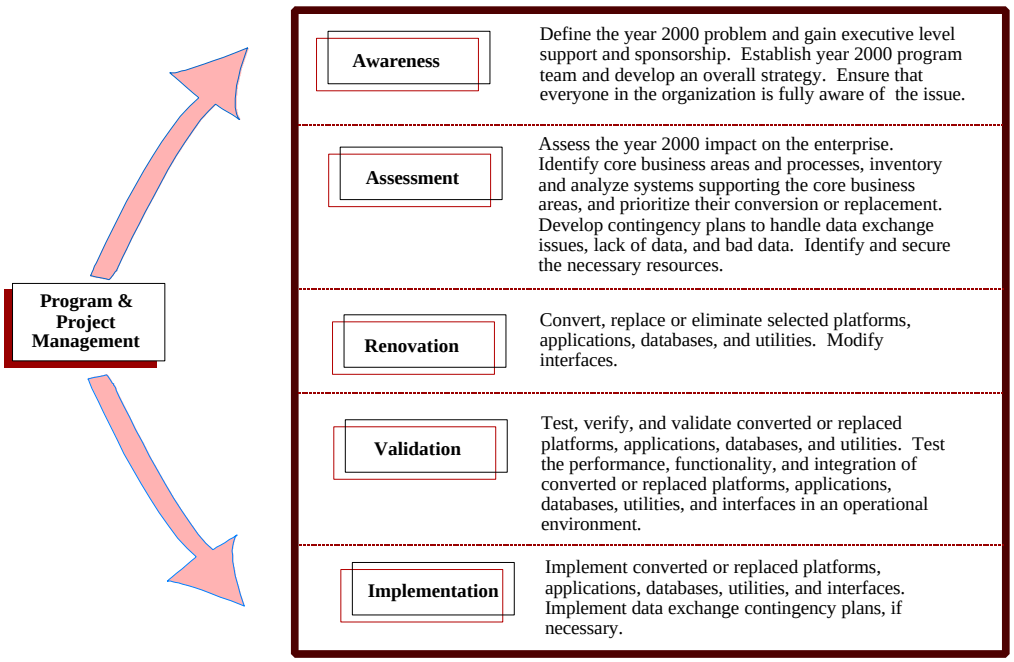
Customer Involvement: Throughout the stages of each system renovation, the customer and /or user will be kept current on the status of their system by local Y2K coordinators and through the quarterly and periodic reports. Contingency plans will be developed for all Mission-Critical systems in conjunction with Y2K coordinators and application's supporting organization.

Verification: Each office will also be responsible for certifying Y2K compliance of automated/electronic controllers found in their areas of responsibility. These controllers include various devices associated with air conditioning, water release valves, elevators, etc. Coordination with local Y2K coordinators on these issues is essential to assure documentation of compliance or noncompliance, and action planning to assure compliance in older systems.

Reclamation's Y2K Strategy

As promoted by both the OMB and the GAO, Reclamation has adopted the five phase approaches in dealing with the Y2K Problem: Awareness, Assessment, Renovation, Validation, and Implementation. The following diagram illustrates and defines these five phases:

Y2K Program & Project Management Phases

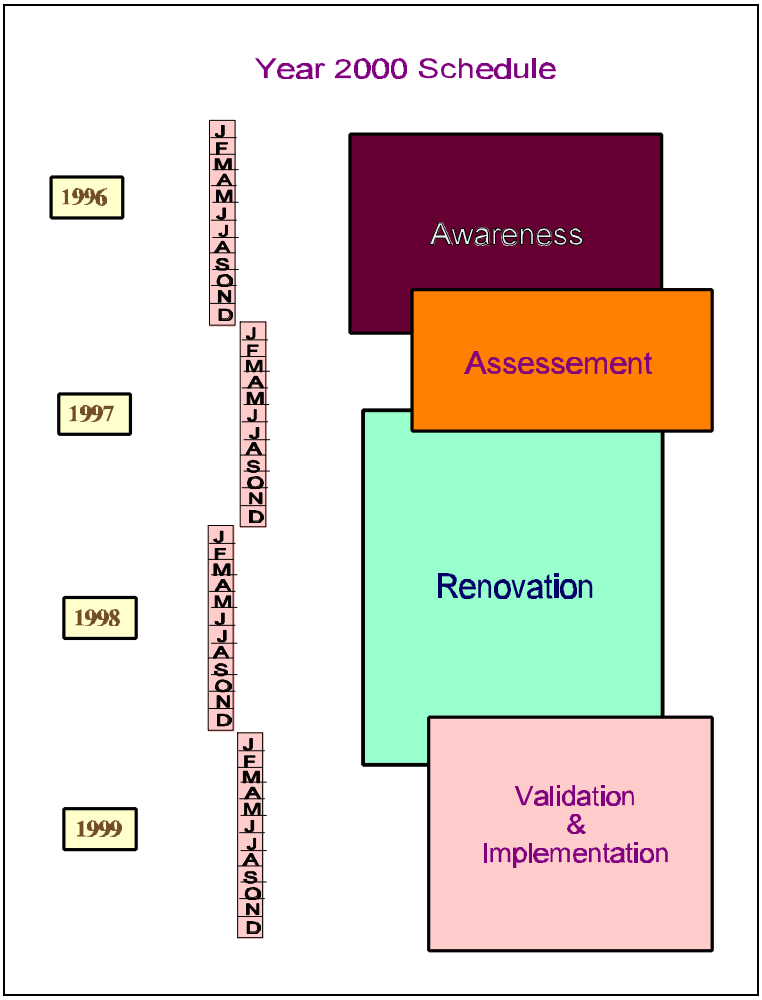


Plan and manage the year 2000 program as a single large information system development effort. Promulgate and enforce good management practices on the program and project levels.

The design of this document and the strategy for Y2K compliance within Reclamation adheres to the five phases described above. Although Reclamation, like many agencies, was slow beginning the awareness phase, we're now aware Reclamation-wide of the potential implications of the Y2K problem, and have taken serious steps to repair them.

The following diagram illustrates the time phases recommended by the GAO, and implemented by Reclamation from the Assessment phase onward.

Y2K Phase Timing:



Reclamation is currently (May 1997) on track with the mandated phases noted above, and will continue to remain in sync with each phase or exceed the noted time-lines whenever possible.

Contingencies

All Mission-Critical systems will have a contingency plan or replacement solution developed in the event the system is not renovated before December 31, 1998, or if the system fails due to Year-2000 problems. <u>These plans will be in place no later than July 7, 1997.</u> Mission Critical system contingency plans must allow sufficient cushion for emergency replacement of the application if necessary.

The system owner is responsible for the development of the contingency plan of each Mission-critical system, and can be assisted by the local Y2K coordinator and other IT staff in the plan's development. The question "What are we going to do to recover the system" must be answered with each plan.

Systems recording data which cannot be manually recorded must be identified and contingencies put in place if these systems are noncompliant, even if they're not considered Mission-Critical. Contingency plans for these types of systems will be documented by August 8, 1997.

Software Applications

The following table summarizes the sixty-three identified applications developed within Reclamation that are not-compliant and have been designated as those for renovation. These same applications are detailed in appendixes A and B.

Office/ Region	*Mission Critical*	*Mission Essential*	*Mission Impaired*	*Non-Mission Essential*	*Unassessable*
GP	3	2	0	5	0
LC	1	0	0	1	0
MP	0	7	0	8	0
MSO	1	0	1	1	0
PN	12	1	0	0	0
TSC	2	2	1	0	0
UC	3	8	0	4	0
Total	**22**	**20**	**2**	**19**	**0**

Major COTS Contingency: Major COTS software and hardware systems which are found to be not Y2K compliant, and are not scheduled for update or replacement prior to December 31, 1997, as needed for application renovation, will need to be updated or replaced prior to this date to assure compliance. The Reclamation TIRC team will ascertain these situations on a case by case basis, coordinating upgrades and replacement of Reclamation-wide systems with D-7100.

Electronic Controllers

Various electronic and automated controllers exist throughout Reclamation. Responsibility for ascertaining and assurance of Y2K compliance is the responsibility of each office.

Of particular concern are those controllers owned or unique to Reclamation. These specialized controllers include Remote Telemetry (Terminal) Units **(RTU)**, Data Collection Units **(DCU)**, Rate of Flow Measurement/controller devices, Flow Meters, Pumping Plant Meters, Seismic Detectors, Piezometric Pressure detectors, Global Position Systems, Relays, Auto-Dialers, Auto Data-tenders, Strain & Displacement detectors, Trim-mark indicators, etc. Many of these devices have no dependance on date parameters, and therefore are Y2K compliant, however some use date parameters and will be analyzed and replaced if necessary prior to January 1, 2000.

Controllers found in business buildings and offices are the responsibility of the office's property and facilities manager. Recognizing many of these controllers are outside of the control of Reclamation, such as those furnish by GSA and other government or private industry entities, it is still the responsibility of our Reclamation facilities' managers to assure these issues are addressed and completed by the responsible parties.

Computer Hardware Replacement

Servers: Non-Y2K compliant servers, LAN, UNIX, WEB, etc., used for renovation projects, will be replaced or appropriately upgraded to compliance no later than December 31, 1997. This is necessary to accommodate the renovation and testing of those systems identified to be renovated prior to December 31, 1998. Assuring Y2K-Compliance of all computer servers, includes minicomputers, must be the first milestone to reach total Reclamation Y2K compliance.

Communication Equipment: Nearly all communication hardware and software identified either were Y2K compliant or have been planned for replacement before the year 2000.

PC's: The replacement of Personal Computers (PC's), can be a significant cost to Reclamation. For purely Y2K compliance reasons, nearly all noncompliant PC's, can be made compliant with the replacement of the "bios" hardware/firmware, which may cost as much as $300 per unit.

Offices which have a normal replacement cycle of three years, probably will not incur substantial PC replacement costs to ensure Y2K compliance. Offices with longer cycles need to be aware that as many as 75% of Reclamation PC's have been found to be out of compliance (Primarily in offices using older 486 and 386 technologies) and will either need to be replaced or

upgraded with compliant bios hardware/firmware.. These offices need to accelerate acquisitions of Y2K compliant PC's. Those offices with no replacement cycle will be identified and strategies put into place to assure compliance prior to the year 2000.

LAN supported PC's, may not have the urgency for replacement due to the Y2K issue. However, migration to client/server technology will probably demand replacement of the older PC's.

PC replacement funding for Y2K may have to wait until fiscal years 1999 and 2000 due to expenditures needed to renovate applications and replace critical systems.

COTS Software Replacement

An extensive inventory of Commercial Off-The-Shelf (COTS) software used within Reclamation has been compiled, and compliance information has been either ascertained or requested from the vendors. Nearly all vendors, still in the software business have either certified their products as compliant or committed to later versions available before the year 2000 which will be compliant.

Some software has been determined to be noncompliant, and will have to be replaced because of the following:

- The vendor is no longer in business, or no longer supporting the software.
- The software is either Free-ware or Shareware and has no warranty or upgrade capabilities.

Many software products used within Reclamation have been determined noncompliant yet will be replaced prior to the year 2000 because of normal version upgrades, and will become compliant with the later versions.

We also recognize several software products simply will not be used due to changes in technology, and the method of doing business.

Software deemed both critical and non Y2K compliant, and also not available for upgrade will have a contingency plan developed by D-7100, which will include replacement of the software packages, and integration of the new product within the affected business process.

Acquisition Requirements: Reclamation IRM Directive 02-01, dated December 3, 1996, requires all acquisitions of automated systems, including all hardware and software, be Y2K compliant. All procurement for automated systems must contain a written requirement for Y2K

compliance.

Additional requirements have since been issued by GSA and OMB to assure the acquisition of only Y2K compliant automated systems.

Testing Strategies:

UNIX and LAN "test-beds" will be available for all renovated applications running from those platforms. The Reclamation Technical Information Resources Committee (TIRC) will coordinate the selection and administration of the needed test-beds. Non production or off-line systems will be obtained whenever possible.

The following scenarios must be met for a renovated application to be considered Y2K compliant, and ready to beta-test and implementation:

- Display a four-digit year in:
  - Reports
  - Screens
  - Shared interface files
  - Relational database tables
- A four-digit year must be found in all date fields
  - Julian dates will be formatted as YYYYDDD
- Operating system will be set for Year 2000 dates during testing.
- Test dates include dates during calendar year 1999 and 2000
- Leap year tests will be checked.
- Hardware & Operating Systems will be verified for Y2K compliance.

Development test areas will include expertise and availability of the following:

Ingres	OS2	NT	HP/UX	Sun Solaris
Oracle	Netware	DOS	Win 3.1	Sun O/S
VMS	Win 95	DG/UX	Sun/UX	Middle-ware